REMARKS

Claims 1-17 are pending in the instant application. Claims 1 and 9 are independent.

Applicants appreciate the Examiner's consideration of applicants' Information Disclosure Statements filed on September 21, 2005, and October 17, 2005.

Claims 1-17 are presented to the Examiner for further prosecution on the merits.

A. Asserted Anticipation Rejection

In the outstanding Office action, mailed February 22, 2006, the Examiner rejected claims 1-17 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,977,706 to Cho et al. ("the Cho et al. reference"). Applicants respectfully traverse this rejection, and respectfully submit that the Examiner failed to set forth a *prima facie* case of anticipation for at least the reasons set forth below.

1) Independent Claim 1

Claim 1 recites,

> A method for vacuum-mounting at least one microdevice on a substrate, the method comprising:
> attaching a getter to an interior surface of a cavity formed on a cover;
> aligning the cavity on the cover and the microdevice on the substrate in a vacuum chamber;
> detecting a degree of vacuum in the vacuum chamber;
> adjusting the degree of vacuum in the vacuum chamber to achieve a predetermined degree of vacuum; and
> bonding the cover and the substrate, thereby sealing the cavity.

In the outstanding Office action, the Examiner asserted that the Cho et al. reference discloses the method recited in claim 1. Applicants respectfully disagree, and respectfully submit that the Cho et al. reference fails to disclose, or even suggest, each and every element of claim 1.

For example, the Examiner asserted that the Cho et al. reference discloses "aligning the cavity on the cover and the micro device on the substrate in a vacuum chamber (column

12, lines 8-25); . . ." *Office action of Feb. 22, 2006, at page 2, paragraph no. 2.* However, contrary to the Examiner's assertion, the cited passage of the Cho et al. reference clearly describes the alignment process as occurring "in a non-vacuum environment," stating,

> Using a suitable alignment system (not shown), structures 40 and 42/44/46/50/52 are positioned relative to one another in the manner shown in FIG. 4c. This entails aligning sealing areas 40S and 44S (vertically in FIG. 4c) and bringing the interior surface of baseplate structure 40 into contact with the upper edges of spacer walls 46. Because getter supports 52 are shorter than outer wall 44 and thus are shorter than spacer walls 46, baseplate structure 40 is spaced vertically apart from supports 52. The alignment is done optically *in a non-vacuum environment*, normally at room pressure, with alignment marks provided on plate structures 40 and 42 for aligning them, thereby causing sealing areas 40S and 44S to be aligned. Plate structures 40 and 42 and outer wall 44 now form a hollow structure having a cavity in which spacer walls 46 and getter structure 50/52 are situated. Spacer walls 46 are sufficiently taller than outer wall 44 that a gap 54 extends between sealing areas 44S and 40S.
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> (*The Cho et al. reference, at col. 12, lines 8-25, emphasis added.*)

Furthermore, the Examiner asserted that the Cho et al. reference discloses "detecting a degree of vacuum in the vacuum chamber (column 13, lines 4-14); adjusting the degree of vacuum in the vacuum chamber to achieve a predetermined degree of vacuum (column 13, lines 15-45); . . ." *Office action of Feb. 22, 2006, at page 2, paragraph no. 2.* However, the cited passages of the Cho et al. reference fail to disclose detecting and adjusting a degree of vacuum. Instead, the cited passages describe activating a gettering material using a laser, stating,

> Laser 58 can be implemented with anyone of a number of different types of lasers such as a semiconductor diode laser, a carbon dioxide laser (with the beam offset by 90°), an ultraviolet laser, or a neodymium YAG laser. For example, laser 58 is typically a diode laser such as the Optopower OPCA 015-810-FCPS continuous-wave integrated fiber-coupled diode laser module whose beam wavelength is approximately 0.85 μm. The laser power is typically 2-5 w. The width of getter strip 50 is typically no more than the diameter of laser beam 60. For a 2-mm width of getter 50, the diameter of beam 60 is typically 3 mm.

> With the tacked structure at room temperature and with the pressure in chamber 56 at the high vacuum level, laser beam 60 is optionally scanned along the length of getter 50 to raise its temperature to a sufficient value to activate getter 50. The activation temperature is in the range of 300-950° C. More particularly, the activation temperature is 700-900° C, typically 800° C.
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> A single scan along the length of getter strip 50 is normally sufficient to activate all the gettering material of getter 50 as long as the diameter of laser beam 60 is at least the width of getter 50. If the diameter of beam 60 is so small compared to the width of getter strip 50 that some of the gettering material is likely not to be activated during a single laser scan, beam 60 can be scanned two or more times along different laterally separated paths that extend along the length of getter 50.
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> When laser 58 is operated in the preceding manner, each part of getter strip 50 is subjected directly to laser beam 60 only once. While the part of getter 50 immediately subjected to beam 60 is raised to a high temperature in activating that part of getter 50, the temperature of the activated part of getter 50 drops rapidly after beam 60 passes on. Consequently, only a small part of getter 50 is at a high temperature at any time. Secondary heating of components 40-46 by way of radiation from getter 50 is thus very small.
>
> Using a heating element (not shown), the flat-panel display is raised to a bias temperature of 200-350° C, typically 300° C. The temperature ramp-up is usually performed in an approximately linear manner at a ramp-up rate in the vicinity of 3-5° C/min.
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> (*The Cho et al. reference, at col. 13, lines 4-45.*)

Applicants respectfully submit that the Cho et al. reference discloses, at most, placing a partially sealed flat-panel display in a vacuum chamber and pumping down the vacuum chamber to, e.g., 10^{-6} Torr or lower. *See, e.g., the Cho et al. reference at col. 12, lines 43-49.* However, the Cho et al. reference fails to disclose detecting and adjusting the degree of vacuum in the vacuum chamber, as recited in claim 1.

Thus, it is apparent that the Cho et al. reference fails to disclose aligning the cavity on the cover and the microdevice on the substrate in a vacuum chamber, and detecting and adjusting a degree of vacuum in the vacuum chamber, as recited in claim 1. Moreover, there

are several other significant distinctions between the subject matter recited in claim 1 and the structures illustrated in the Cho et al. reference.

In particular, claim 1 recites, "attaching a getter to an interior surface of a cavity formed on a cover." The Examiner asserted that FIG. 4d of the Cho et al. reference illustrates this aspect of claim 1, indicating that the getter 50 is attached to the cover 40. *Office action of Feb. 22, 2006, at page 2, paragraph no. 2.* However, applicants respectfully submit that the getter 50 in the Cho et al. reference is attached to getter supports 52, rather than the interior surface of a cavity formed on a cover, as recited in claim 1.

Additionally, claim 1 recites, "bonding the cover and the substrate." The Examiner asserted that FIG. 4d of the Cho et al. reference illustrates this aspect of claim 1, referring to col. 18, lines 1-5 of the Cho et al. reference. *Office action of Feb. 22, 2006, at page 2, paragraph no. 2.* However, applicants note that the cited passage of the Cho et al. reference clearly indicates that the cover is not bonded to the substrate, but rather to the outer walls 44.

Finally, applicants respectfully submit that the Cho et al. reference fails to disclose a "cavity formed on the cover," as recited in claim 1. In particular, referring to, e.g., FIG. 4d of the Cho et al. reference, it is apparent that the cover 40 has flat surfaces, and therefore has no cavity.

In view of the above, applicants respectfully submit that the Cho et al. reference fails to disclose each and every element of claim 1, and thus the Cho et al. reference fails to anticipate claim 1. Therefore, applicants respectfully submit that claim 1 is allowable over the Cho et al. reference. Claims 2-8 and 17 depend from claim 1 and are believed to be similarly allowable.

2) Independent Claim 9

Claim 9 is directed to an apparatus for vacuum-mounting a microdevice, the apparatus including a gas injecting section, a substrate aligning section, a bonding section, and a

controlling section. In the outstanding Office action, the Examiner asserted that the Cho et al. reference discloses each of these sections. Applicants respectfully disagree, and respectfully submit that the Cho et al. reference fails to disclose, or even suggest, each and every element of claim 9.

For example, the Examiner asserted that the Cho et al. reference discloses an "apparatus comprising: a gas injecting section for injecting an inert gas into a vacuum chamber (column 25, lines 12-28); . . ." *Office action of Feb. 22, 2006, at page 3, paragraph no. 10.* However, the only apparatus described in the cited passage of the Cho et al. reference is a flat-panel display, and the only mention of an inert gas is an inert gas that is contained within the flat-panel display:

> While the invention has been described with reference to particular embodiments, this description is solely for the purpose of illustration and is not to be construed as limiting the scope of the invention claimed below. For example, a getter akin to getter strip 74, 94, or 114 can be situated in an auxiliary compartment of a reduced-pressure flat-panel device such as a plasma display or a plasma-addressed liquid-crystal display having a main compartment in which a plasma is formed during display operation. The auxiliary and main compartments are connected together so that the pressures in the two compartments substantially reach a common pressure between room pressure and a high vacuum due to the presence of inert gas in the two compartments. The inert gas is typically xenon, neon, helium, krypton, or/and argon. The pressure in the auxiliary and main compartments of the reduced-pressure device is at least 1 torr, typically 5 torr to 0.5 atm.
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> (*The Cho et al. reference, at col. 25, lines 12-28.*)

Furthermore, the Examiner asserted that the Cho et al. reference discloses,

> . . . a controlling section for controlling the substrate aligning section to align the substrate and the cover, for adjusting a degree of vacuum in the vacuum chamber to a predetermined degree of vacuum by controlling the gas injecting section, and for controlling the bonding section to bond the substrate and the cover together after the predetermined degree of vacuum is realized, thereby sealing the cavity (column 13, lines 46-58).
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> (*Office action of Feb. 12, 2006, at pages 3-4, paragraph no. 10.*)

However, the cited passage of the Cho et al. reference fails to disclose the claimed controlling section. Instead, the cited passage describes parts of a flat-panel display, stating,

> Spacer walls 46 run generally perpendicular to the length of getter strip 74.
>
> Auxiliary compartment 72 overlies main compartment 70 above part of the exterior surface of baseplate structure 40. Auxiliary compartment 72 is formed with baseplate structure 40 and a five-sided transparent auxiliary wall 76 consisting of a relatively flat rectangular top portion 76T and four relatively flat rectangular lateral portions 76L arranged in a rectangular annulus. Top auxiliary wall portion 76T extends generally parallel to baseplate structure 40. Lateral auxiliary wall portions 76L extend generally perpendicular to both top wall portion 76T and baseplate structure 40.
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> (*The Cho et al. reference, at col. 13, lines 46-58.*)

Thus, it is apparent that the cited passages of the Cho et al. reference fail to describe any part of an apparatus for vacuum-mounting a microdevice, or any kind of controlling section whatsoever. Moreover, to the extent that the Cho et al. reference may describe equipment for assembling a flat-panel display, applicants respectfully submit that the Cho et al. reference fails to disclose, or even suggest, that a single apparatus is being described.

Additionally, as discussed above regarding claim 1, there are several other significant distinctions between the subject matter recited in claim 9 and the structures illustrated in the Cho et al. reference. For example, claim 9 recites, "bonding the substrate and the cover together." The Examiner asserted that FIG. 4d of the Cho et al. reference illustrates this aspect of claim 9, referring to col. 12, lines 43-46 of the Cho et al. reference. *Office action of Feb. 22, 2006, at page 2, paragraph no. 2.* However, applicants note that, taken in context, the Cho et al. reference clearly indicates that the cover is not bonded to the substrate, but rather to the outer walls 44. *See, e.g., the Cho et al. reference at col. 12, lines 37-39.*

Also, applicants respectfully submit that the Cho et al. reference fails to disclose a "cavity formed in a cover," as recited in claim 9. In particular, referring to, e.g., FIG. 4d of

the Cho et al. reference, it is apparent that the cover 40 has flat surfaces, and therefore has no cavity. Further, it follows that the Cho et al. reference necessarily fails to disclose "the cavity housing a getter" as recited in claim 9.

Accordingly, applicants respectfully submit that the Cho et al. reference fails to anticipate the apparatus for vacuum-mounting a microdevice recited in claim 9, and applicants respectfully submit that claim 9 is allowable over the Cho et al. reference. Claims 10-16 depend from claim 9 and are believed to be similarly allowable. Therefore, applicants respectfully request that this rejection be reconsidered and withdrawn.

B. Conclusion

If the Examiner believes that additional discussions or information might advance the prosecution of the instant application, the Examiner is invited to contact the undersigned at the telephone number listed below to expedite resolution of any outstanding issues.

In view of the foregoing amendments and remarks, reconsideration of this application is earnestly solicited, and an early and favorable further action upon all the claims is hereby requested.

Respectfully submitted,

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PETITION and DEPOSIT ACCOUNT CHARGE AUTHORIZATION

This document and any concurrently filed papers are believed to be timely. Should any extension of the term be required, applicant hereby petitions the Director for such extension and requests that any applicable petition fee be charged to Deposit Account No. 50-1645.

If fee payment is enclosed, this amount is believed to be correct. However, the Director is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account No. 50-1645.

Any additional fee(s) necessary to effect the proper and timely filing of the accompanying-papers may also be charged to Deposit Account No. 50-1645.